



The Raleigh Amateur Radio Society's **EXCITER**

GET INVOLVED

- RARS General Membership meeting: Second Tuesday of the month.
- The RARS net meets every night except Saturday @ 8 p.m. on 146.640.
- The RARS Technical & Trader's net: Saturdays @ 8:00 PM on 146.64.
- RARS meets for a monthly dinner on the First Tuesday of each month. Its at 6:30PM at the Golden Corral Restaurant, 6129 Glenwood Ave., Raleigh.



PUBLIC SERVICE EVENTS

Interested in helping? Visit <http://www.rars.org/public-service.php>

frequently for our 2016 ham public service schedule.

RARS General Meeting

Topic: RARS Officers Nominations & Show and Tell

Date: November 8, 2016

Time: Meeting at 7:30 p.m.

Informal gathering and refreshments from 7 - 7:30 p.m.

Where: Ridge Road Baptist Church. 2011 Ridge Rd., Raleigh
New HAM / Elmer meeting, 6:00 p.m. before member meeting

Tadd Torborg, KA2DEW, Elmer Coordinator

[Click here for more information.](#)

RARS President's Message

It's hard to believe that Fall has arrived. The weather is cooling off and the leaves are turning and falling. That means it's time to check on your dipoles as they are easier to work with in the absence of the foliage. Hopefully everyone who wanted to got a chance to visit the NC State Fair in October. The fair is a great event to showcase the goods and services of the agricultural industry in North Carolina as well as to dine on deep fried (anything you can imagine

[Continued on page 3](#)

RARS Officers

PRESIDENT

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VICE PRESIDENT

Tom Lewis
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919-870-9342
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SECRETARY

Bob Chapman
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TREASURER

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The Raleigh Amateur Radio Society

The Raleigh Amateur Radio Society, Inc. (RARS) was founded in 1969 and continues to serve and support the amateur radio community in the greater Triangle area. In 1999, the society incorporated a new RARS and obtained 501(c)(3) non-profit tax status.

The objectives of the club are to promote worldwide friendship through amateur radio; to be of public service by providing radio communications in times of disaster, emergency, or civic needs; to educate members in radio technique, and to provide training classes to assist in obtaining amateur radio licenses.

Anyone interested in amateur radio is eligible to apply for membership. Dues for regular licensed amateurs are \$18 per year (from July 1 through June 30). Additional immediate family members pay \$5 each per year. Dues for licensed amateurs older than 59 or younger than 16 are \$12 per year. Dues for non-licensed associate members are \$9 per year. Applications for membership may be obtained from the treasurer or on the RARS website (www.rars.org).

Exciter

The Exciter is the official newsletter of the Raleigh Amateur Radio Society. It appears each month as a PDF on the RARS website at www.rars.org. Members receive email notification when the latest version is available. Please provide your email address to the Treasurer.

The Exciter welcomes articles, advertisements, and other contributions. To submit a piece to the newsletter, please contact the Editor. The Editor reserves the right to edit any and all pieces. The submission deadline for each month's Exciter is the third Friday of the preceding month. All submissions must be final. Drafts are not accepted.

The views expressed in the Exciter are those of the individual authors and do not necessarily reflect the views of the Editor or RARS.

Tom Lewis, N4TL, editor (editor@rars.org)

For Your Information

RARS General Meeting

Date: Second Tuesday of each month

Location: Ridge Road Baptist Church 2011
Ridge Road Raleigh, NC, 27607

Time: People begin arriving at 7 p.m. The meeting officially begins at 7:30 p.m.

RARS Monthly Dinner

All members and guests are welcome to the monthly (first Tuesday) RARS Supper, 6:30PM, at the Golden Corral Restaurant, 6129 Glenwood Ave., Raleigh. Informal and Dutch, just bring your appetite and best rag to chew. 73, Chuck, K4HF

RARS Repeaters in Raleigh

146.64-, 444.525+ (82.5) and

145.13- (82.5), (82.5 is the tone freq)

Join us for the nightly RARS net at 8 p.m. on the 146.640 repeater. All hams holding a Technician class license or higher are invited to check in. We welcome both RARS and non-RARS members to the net.

There is a net Listing on the RARS website click here. <http://www.rars.org/nets.php>

VE Testing

The RARS VEs will accept walk-in testing in February, May, August and November at 5:30PM, prior to RARS membership meetings at Ridge Road Baptist Church; the RARSfest in April; the Cary Swapfest in July; the JARS-Fest in November; and following RARS license classes. Please bring a photo ID, your original and a copy of your current license, your \$14 exam fee, and any valid CSCEs that prove passing elements beyond that of your current license. Visit www.rars.org for more information.

President's Message continued

and some you can't).

Thanks to the RARS members who volunteered for the Boy Scouts Jamboree On The Air in October. The weather was ideal and there was a good turnout of scouts. It looks like plans are already underway for an even greater event next year.

This has been a sad month for RARS. We have had three silent keys in the past month, John Irwin, N4YRB, Don Cowden, N8DDK, and Al Cooke, NC4AL. Also, Larry Young, K4LXV, is experiencing some health issues. Please keep these families in your thoughts and prayers.

As we enter the holiday season and celebrate Thanksgiving and Christmas, I wish you all safe travels as you visit family and friends near and far.

73,

Dennis Keith

NC4DK

RARS October Birthdays

Joe	WA4GIR	11/02
Ed	KE4YEM	11/03
John	KM4RMV	11/04
Carroll	KD4JH	11/07
Jeff	AC4ZO	11/08
Lynn	W9CLF	11/09
Rich	NC4EN	11/11
Chris	N3JHR	11/14
Joshua	KF4ZXK	11/15
Glenn	NC4NC	11/16
Rolf	K8SL	11/19
Nikolay	KM4UAG	11/20
Donna	KM4WRP	11/20
Bill	KG4CXY	11/24
Scott	KI4OCF	11/24
Laura	KG4WQT	11/24
Terri	N4ZUD	11/25
Doug	N3LTV	11/26
Stu	KM4GDP	11/28

Future Hamfests

A full list of Hamfests can be found at the [ARRL website](#).

11/20/2016 | [JARSFest 2016](#)

Location: Benson, NC

Type: ARRL Hamfest

Sponsor: Johnston Amateur Radio Society

Website: <http://www.jars.net>

03/10/2017 | [Charlotte Hamfest](#)

Location: Concord, NC

Type: ARRL Hamfest

Sponsor: Mecklenburg Amateur Radio Society

Website: <http://www.charlottehamfest.org>

04/15/2017 | [Roanoke Division Convention \(Raleigh Hamfest\)](#)

Location: Raleigh, NC

Type: ARRL Convention

Sponsor: Raleigh Amateur Radio Society

Website: <http://rars.org/rarsfest>

New Members

Rick McWhorter	KD4PJI
Wade Jensen	KG4KAH



October 11 RARS Auction



Auctioneer, Rick Kelly-Crapse, KB4TKQ



There were many bargains at the RARS Auction. Over 100 items were sold.



Education Director

The General course had 14 students including 2 who audited the course. One of those who audited had recently passed the General exam and wanted to be more assured of the information and the other was an Amateur Extra who wanted to brush up. (A RARS member may take any course for which they already have a license for free.) Ten people took the exam in the afternoon of the last session and 7 passed for a 70% pass rate.

Beginning with the course in 2013-02-02 we have had 335 attendees with a pass rate of 79% (when taking the test in the afternoon of the last session). It is hard to keep up with the people (184 separate students) who take the exam after the one affiliated with the course – I do plan to go back and see if others passed later. We had 25 youth (age 15 and younger) take a course (2 took the General course).

There have been 19 courses (10 Technician, 6 General and 3 Extra) and that means 19 exam sessions! VE Team Leaders Joe (WA4GIR) and Liz (KO4CK) White and the VE Team have been great in their support of the license courses by administering the exams the last day of each course. The policy of allowing the examinee to take the next test level free upon passing the prior level (the VE team even encourages the examinee to do that) means they do a lot

of extra testing. Many of the examinees do not come close to passing the second test, but the examiners call it a “learning experience” and encourage the examinee to retry after more studying.

Instructors Mike WA4BPJ and Curt W4CP are the core of the RARS license course program. These dedicated, knowledgeable, tolerant RARS members teach complicated material to students who come from all walks of life, educational backgrounds, ages and experience wanting an ARO license or to upgrade. This stuff does not come easy and our instructors patiently explain (and re-explain) to students who badly want to fulfill a dream. RARS is lucky to have these instructors who care so much to give so much.

Murray K4MHM

ARRL Radio Waves

An article on the Youth Operated Station (YOS) at the 2016 RARSfest appeared in the fall edition of the ARRL *Radio Waves*, an e-newsletter for ARRL registered instructors. The station's core operators were local Boy Scouts but it was open to all youth. As well as covering the station activities, it describes the other activities the Scouts were engaged in at RARSfest. There will be another YOS at RARSfest 2017.

Murray K4MHM

59th Annual Jamboree on the Air – October 15, 2016

by Rob Cox (N4MN)

Thanks to all those who participated in this year's Jamboree on the Air. A super-big shout out to RARS members Dan Marks (N9PQB) and Dennis Mason(WZ0Q) for their help operating and working with the scouts that visited. We also had the help from non-RARS members, Mr. Chuck Ayers (N1KGY) and Mr. Scott Olson (KJ4DAT). Chuck reached out to our own Chuck Littlewood (K4HF) requesting RARS help for a JOTA station that he was putting together in Wake Forest. Chuck 1 put Chuck 2 in touch with me and after a few emails back and forth Chuck Ayers decided to join us and bring his Cub Scouts along too. Scott Olson is a scouter and the father of two scouts who are ham radio operators in Troop 310.

We began the day at 7:00am by setting up canopies borrowed from the Occo-neechee Council (BSA) offices. There were some boys there from BSA Troop 310 and they helped setup the tents, the tables and chairs and run power to each station. By 10:00am we were all setup and tested and



ready for the visitors. This year's venue was at the Church of Jesus Christ of Latter-day Saints on Six Forks and Shelly Road in North Raleigh. This area has a large front lawn with plenty of areas for tents and antennas. It also has a very large parking lot for visitors.

Let me outline the stations that we had operating during this event.

Our 2-meter station was a Yaesu 817ND connected to a homebrew copper J-pole antenna attached to a painter's pole. This station was manned by Dennis Mason and he helped scouts make contacts throughout the county on the RARS 146.64 repeater. Den-

59th Annual Jamboree on the Air – October 15, 2016

nis also deserves some big award (I haven't determined which one yet) because he did all this work even though his morning coffee was accidentally spilled all over the sidewalk. (sorry about that Dennis)

Dan Marks had a wonderful Yaesu 857D mobile HF station that he had put together. With this station Dan was able to show visitors the beauty of an HF rig that was able to run off of battery power and that was completely self-contained. Dan also put together a large display to visually show visitors how to make contact and log a QSO. The display showed how radio works, it talked about transmitters and receivers, it outlined how to become an amateur radio operator and presented the scouts with 8 steps involved in making an HF contact and logging the QSO. This poster could be used for other YOS (Youth Operated Stations) and GOTA (Get On The Air) stations during Field Day and RARSfest.

Chuck Ayers had two HF rigs that he set-up with two different antennas. He was able to demonstrate CW and show his cub scouts how to tap out Morse Code. Dan's and Chuck's HF stations did well despite the band conditions they were able to log con-

tacts in Florida, Louisiana, Indiana, Tennessee, Kentucky, Ohio, Pennsylvania, Alabama, Arkansas among others. These stations primarily worked 20m and 40m and gave the Scouts some experience making HF contacts on SSB. Our recently granted call sign for the event was KF4BSA. This call was previously owned by Mr. Jason Engholm (who is now KE2P) of Stafford, Virginia. I received a request from Jason who wanted to see if he could make contact with us during JOTA so he could have both his old call sign and his new call sign in the same log. Alas, the propagation gods were not smiling on us as we were not able to complete the contact. Perhaps next time.

The final station was a Yaesu 991 operating digitally on 20 meters using a Buddipole at about 20 feet. I had a computer connected to the rig and, because of the band conditions, we were operating JT-65. I had two monitors, one running Ham Radio Deluxe and HRD Logbook and a web browser with PSKreporter.info and QRZ.com. The other monitor had WSJT-X and JTAAlert. Even without making contacts, I was able to show the scouts where my signal was being heard throughout the United States and Canada and also over in Europe. We logged contacts in

59th Annual Jamboree on the Air – October 15, 2016

Venezuela, Arizona, Ontario, and Cuba. But the highlights of the day were logging contacts with RA6AN in European Russia (5,622 miles), OM4AB in the Slovak Republic (4,711 miles) and LZ1UBO in Bulgaria (5,133 miles).

We had between 40 and 45 visitors and 30 scouts signed in on our visitor log. There were scouts from as far away as Cameron (54 miles), Youngsville (34 miles), Mebane (46 miles) and from Faison (67 miles) North Carolina. There were others from Hillsborough, Cary, and Wake Forest as well. Other visitors included current RARS President, Dennis Keith (NC4DK), former RARS President, Murray Merner (K4MHM), AARL NC Section Manager, Karl Bowman (W4CHX), AARL NC Section Youth Coordinator for Scouting, Dave Price (K4KDP), and ARRL Liaison, Chuck Littlewood (K4HF) among others.

Please mark your calendars for next year, October 21, 2017. This will be the 60th Annual Jamboree on the Air. I anticipate that we will hold the event at the same place, but this time with more activities and stations. For instance, Dave Price taught a scout who was

attendance the entire Radio Merit badge during his visit. It would be fantastic to offer this as a place for scouts to learn about Ham Radio and to pass off the requirements for the Radio Merit Badge. We also had some DMR radios that were not used because we didn't have the volunteers to teach the boys how to use them. More volunteers would also allow us to have two adults at each station and to have one act as a spotter while the other demonstrates radio operation. Spotting could be placing our call sign and frequency on spotter networks and social media and then waiting for the pileup or looking at the spotter networks and determining which bands and frequencies other JOTA stations are transmitting on. Another idea would be to have an off-the-grid station setup to use Winlink to demonstrate how HF and Ham Radio can be used to send and receive email in a disaster scenario.

Anyway, thanks for paying attention all the way to the end. We had a blast at JOTA and we look forward to doing it again next year.

73, Rob Cox (N4MN)

59th Annual Jamboree on the Air – October 15, 2016



Photo 1: HF SSB Tents and a 2-Meter Station in the middle



Photo 2: Donuts and Digital Modes (JT-65)

59th Annual Jamboree on the Air – October 15, 2016



Photo 3: Chuck Ayers (N1KGY) talking to his Cub Scouts and Dennis Keith (NC4DK)



Photo 4: Left to Right - Dave Price(K4KDP), Chuck Ayers(N1KGY), Rob Cox(N4MN), Karl Bowman (W4CHX), Murray Merner (K4MHM)

The New Hams meeting

In November we're going to try to set up a 40m station and operate it from the courtyard in front of the fellowship hall entrance. We'll try to get everybody who shows a chance to talk to somebody somewhere across the country. The last time we did this a station in Troy NY gave us an hour of his time to talk to everybody.

One of our goals is to use equipment which is readily available for under \$400 for the entire station.

In October we assembled a surplus computer power supply into a DC hamshack power distribution system capable of running five radios. The HP1200 prolant server power supply was modified by W4RFQ to provide 13.8vDC (out-of-the-box it is 12vDC). Our new-ham group soldered and crimped and assembled about \$30 worth of parts to the \$30 power supply to make it support a multi-radio hamshack.

Tadd, KA2DEW was the M.C.

Old hands
NC4FG, Fin
Nathan KM4DVE
W4BFG Rick

New hams
Donna KM4WRP
Joseph KM4WRQ

Not yet licensed
Bob Thorn — really new
Wade KK4UGY new
Dick Gray — really new
Nick Waun — really new
Tom Johnson — really new

The fuse block and ground bus are both available from Amazon.
Powerpole connectors and crimpers from Quicksilver Radio or PowerWerx.
Spade lugs also from Amazon.

See this web page for details:

http://tarpn.net/t/builder/builders_power_supplies.html

73 Tadd, KA2DEW



Tadd, KA2DEW



HP1200 prolant server power supply

Photos by Tadd, KA2DEW

New HAM / Elmer meeting,

6:00 p.m. before the member meeting

Tadd Torborg, KA2DEW, Elmer Coordinator

The New Hams meeting is held every month before the regular RARs meeting. We'll try to start by 6pm. We try to address topics in a manner that will be of help to hams in their first year of operation.

Tadd / KA2DEW

tadd@mac.com

Raleigh NC FM05pv

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RARS member encourages young people to learn about HAM Radio

On most Saturdays, Pam Kelly, KM4WRN, mentors youth in the Teach Preparedness Early Program (TPEP). The goal is to encourage self-preparedness among youth, ages 10-17. The program provides skills of global value and lifelong benefit, such as mobile app coding, budgeting, communications skills, multilingualism, solar energy applications and basic electronics. As a recent Technician licensee, Pam encourages her mentees, their parents and others in the community to become Amateur Radio Operators. She is excited about the possibility of establishing an Amateur Radio station at St. Paul AME Church in Raleigh, to serve as an emergency communications resource and a STEM

learning opportunity. TPEP, always having its resources stretched to the limit, has few resources to develop a station so donations from the community would be appreciated.

Many thanks to Murray Merner K4MHM and Antoinette Williams KK4TTX, for “lighting the spark” of interest in ham radio with their visit to our 1st Annual Youth & Family Preparedness Day this past June. The best is yet to come!

Pamela P. Kelly PO Box 28775, Raleigh, NC 27611 * 919.998.9349 * pamkel-lyrtpnc@yahoo.com Live, by faith, for today. Plan, by faith, for tomorrow.



Photo by Pamela P. Kelly

The Extraordinary Tale of the Raspberry Pi

Here is a URL for a Design News article about the Raspberry Pi. Less than four years ago, a tiny credit-card-size computer changed the world for students, gadget makers, industry, even space. [The Raspberry Pi](http://www.designnews.com/author.asp?section_id=1386&doc_id=281793) showed up in February 2012 with modest expectations and a low price of \$25. This little computer from the United Kingdom soon became much more than its founder expected.

www.designnews.com/author.asp?section_id=1386&doc_id=281793

Deepest Sympathies

A transfer of \$50 each has been made to the RARS Youth Education fund in memory of
Al Cooke NC4AL 10/4/2016 and
Don Cowden N8DDK 10/15/2016

Greg KE4PAX

Future RARS Presentations

11/8/2016	RARS Officers election and Show and Tell. Bring something of interest that you have built this year or previous years, maybe years ago. Be prepared to show it off and tell about it. The time will be limited so everyone can have time to show off their item.	Election committee & Members for Show and Tell
12/13/2016	RARS pot luck Holiday party. Sign up at the RARS website. RARS Officers induction.	Election committee
1/10/2017	Writing for QST & Arduino CW Trainer	Tom Lewis, N4TL
2/14/2017	Ham Radio and small UAVs (Drones)	Tiia, KM4CMQ
3/14/2017	Awards, RARS Birthday Party (2/12/69) & RARSfest Update	RARSfest chair

Tar Heel Scanner/SWL SIG group

The Tar Heel Scanner/SWL SIG group met on October 17th at Red Hot and Blue restaurant on Falls of Neuse Road in Raleigh. Thirteen people attended.

Lauren Libby, W0LD, President and CEO of Trans World Radio gave a presentation about the current operations of TWR and the future of shortwave radio. One of the new developments discussed was file casting. This is achieved using the new Pantronix Titus II Android-based tablet radio that is just starting production. It was an excellent presentation which everybody enjoyed.

The next meeting will be held on November 21st at Red Hot and Blue. Tom McKee, K4ZAD, will give a presentation on the SDRplay receiver.

Meetings are held on the third Monday of each month. We meet at 6:30 for dinner and the meeting begins at 7:30 and ends at 9:00. For more information and announcements about the upcoming meetings, see the Tar Heel Scanner / SWL SIG Yahoo group (<https://groups.yahoo.com/neo/groups/tarheelscanner/info>).

73, Kelly, AE4FG



SWL SIG group meeting held on October 17th

Net Control Operator Schedules

RARS would like to thank all of the folks who volunteer their time to make all of these Nets Possible. Opportunities always exist for additional Net Controllers for these Nets. If you'd like additional information, or wish to become a NCO, please contact the [Net Manager](#).

These nets are also reflected on the main [RARS home page](#) each day.

Evening Net Control Operator	
Sunday	KF4HQS Richard
Monday	WX4MMM Bob / KG4OQA Mary
Tuesday	KG4IVD Phillip / KE4PNT Randy
Wednesday	NC4VA Virginia
Thursday	KT4JR Julie
Friday	W4TTO Joe
Saturday	AB4OZ Allan (Includes the Tech Trader Net.)

Net	Time	Net Control Operator
10 Meter Net	Sat. 9:00 pm	Open
Traders/Tech Net	Sat. 8:00 pm	AB4OZ Alan

North Carolina HF NETS

[NC ARRL NTS](#) Nets - part of the ARRL [National Traffic System](#) (NTS):

- NC Morning Net (the morning phone net) - daily at 7:45am on 3.927MHz
- NC Evening Net (the evening phone net) - nightly at 6:30pm on 3.923MHz
- Carolinas Net (early CW net) - nightly at 7:00pm on 3.573MHz
- Carolinas Slow Net (slow CW net)- nightly at 8:00pm on 3.571MHz
- Carolinas Net (late CW net) - nightly at 10:00pm on 3.573MHz

Other North Carolina HF nets:

- Tar Heel Emergency Net - nightly at 7:30pm on 3.923MHz
- QCWA Net - weekly on Saturday morning at 8:45am on 3.826MHz
(The Quarter Century Wireless Association weekly get together.)

Copied from <http://www.rars.org/>

Raleigh Amateur Radio Society
Board of Directors Meeting Minutes
September 20 , 2016

The Board of Directors of the Raleigh Amateur Radio Society met Tuesday, 20 September, 2016, at Ridge Road Baptist Church. President Dennis NC4DK called the meeting to order at 7:05 p.m.

Present: Dennis NC4DK, Tom N4TL, Joanne AK4RJ, Bill AK4BL, Chuck K4HF, Karl W4CHX, Raymond NC4OO, Marty W4MY and Bob NC1X which group did represent a quorum.

The minutes of the August 16, 2016, Board of Directors meeting were approved as corrected by the Board.

Vice President: Tom N4TL reminds all that the deadline for the Exciter is October 1. Please submit articles to Tom before then.

Treasurer: Greg KE4PAX. (By e-mail) Current membership is 324 including 13 honorary members. Anyone who did not receive Greg's Report of 20 September may inquire of the Secretary for additional details.

Secretary: Bob NC1X - The secretary asked that the board understand that the Minutes are a document of what was discussed and what official positions (votes) were taken at the meetings of the Board. They are not verbatim transcripts. Persons desiring that their actual words be included in the minutes should bring a written document and read it into the minutes at the appropriate time, leaving said document with the secretary for inclusion in the official record.

Directors' Reports:

Scouting: Plans are afoot for JOTA on October 15.

FM Repeater Chair (Karl W4CHX): No Report

ARRL liaison (Chuck K4HF): No Report

ARRL NC Section Manager: Karl W4CHX reports there is an ARRL North Carolina Section Youth coordi-

nator for Scouting, Dave Price K4KDP, of Goldsboro. On Monday September 12th, the amended version of HR 1301 Amateur Radio Parity Act was passed by the US House of Representatives and continues to progress through Congress. It was recommended that ARRL members should contact the US Senators from NC and request their support by voting for the bill when it is brought up in the US Senate.

Webmaster: Hank K4HM has been working on the auction preregistration site, which should be available for the auction next month.

Field Day: Dennis NC4DK reports we have a new person, who will be announced later, who has agreed to lead Field Day.

North Carolina QSO Party: Marty W4MY will meet with the South Carolina folks in November. A meeting occurred with the SC group in Shelby and some details will be published in the Exciter.

New Business:

Karl W4CHX moved that: During the approval of board meeting minutes, corrections will be accepted from board members in attendance, and from Board members not attending provided that written corrections are available to the Board for review and discussion. Seconded and approved.

Karl W4CHX reviewed the complexities of repairing, restoring, and managing our repeaters and complimented those who have been involved in this difficult task; and introduced recommendations for a repeater committee, which would work with the FM Repeater Chair to manage the RARS repeaters system. Following discussions by the Board, Karl W4CHX will provide further information for review and discussion

Nominating Committee Report: Chuck K4HF - We need an at-large director to replace Bill AK4BL. We need a candidate for youth director. We also need a food service chair to replace Joanne AK4RJ.

The next Board Meeting will be Tuesday, October 18, at 7:00 p.m. at the church.

The meeting was adjourned by President Dennis NC4DK at 9:25

Respectfully Submitted,

Robert E Chapman, NC1X

RARS Secretary

MINUTES
Raleigh Amateur Radio Society
General Membership Meeting
October 11, 2016

The monthly membership meeting of the Raleigh Amateur Radio Society met at the Ridge Road Baptist Church in Raleigh. The meeting was called to order by President Dennis, NC4DK, at 7:22 p.m.

There were 48 members present, which did constitute a quorum.

There being a quorum present, a motion to accept the minutes of the September 13, 2016 meeting, as published in the Exciter, was made, seconded and approved.

Vice President: Tom N4TL announced that next month's meeting will be Officer elections and show & tell.

Treasurer: Greg, KE4PAX - We have 328 members this month, of which 138 have not renewed for 2016-2017. Many were complimentary. See Greg for other details.

Greg disclosed that John Irwin, N4YRB, died August 17th, and Al Cooke, NC4AL, died October 4th.

Continuing Announcements:

The RARS Dinner takes place monthly on the first Tuesday (next: October 11, 2016) at 6:30 p.m., at the Golden Corral, 6129 Glenwood Ave.

The RARS Board meeting takes place monthly on the third Tuesday at 7:00 p.m. in a conference room here at the Church. Members are invited to attend.

An After-meeting gathering takes place after each Membership meeting, at Applebee's, Hillsboro and Gorham Streets.

A New Ham/ Elmers meeting with new hams and anyone interested takes place at the church at 6:00 p.m. before each membership meeting. Tadd KA2DEW announced that today the group built a power supply. It was a 60 amp supply that cost \$60 to build and can power two 100 watt trans-

Continued on the next page

ceivers in RTTY mode, plus accessories.

Board & Committee Reports

Public Service (John AI4RT): Public Service is winding down for the winter. See the RARS website for details.

Education Director (Murray K4MHM): No report

Field Day (Dennis NC4DK): Field Day will be the last full weekend in June 2017. We will have as new field day leader this year.

FM Repeater (Karl W4CHX) – No report.

N.C. QSO Party (Marty W4MY): We are on track for next year's event. Check NCQSOPARTY.ORG. The QSO party will be in February 2017.

At Large Directors: No reports.

JOTA: Rob N4NM says JOTA will be Saturday October 15th. They will meet to put up antennas. There will be several stations and they could use some help.

Guests: Dennis NC4DK introduced guests Dick Gray (no call), Bob Thorne (awaiting General), Rick W4BFG, Dave K4SAN, Nicholas Waun (no call), Jan Lewis (no call) and Tom Johnson (no call).

New Business: Chuck H4HF presented the Nominating Committee Report/Recommendations:

RARS Officers for a Two-year term:

Vice President: Tom Lewis, N4TL

Treasurer: Greg Seamster, KE4PAX

RARS Board Members for One- year term:

Continued on the next page

Continued from the previous page

Public Service Director: John Snellen, AI4RT

Public Information Officer: Charles Good, KM4AMT

RARS Exciter Editor: Tom Lewis, N4TL

RARSfest 2017 Chair: Ian Hewitt, N0IAN

RARS Net Manager: Mary Holtschneider, KG4OQA

At-Large Director: Joanne Mars, AA3N

At-Large Director: Raymond LeFrancois, NC4OO

At-Large Director: Marty Young, W4MY

FM Repeater Chair: Karl Bowman, W4CHX

W4DW, W4RNC, N4RAL Trustee: Jeff Wittich, AC4ZO

ARRL Liaison: Chuck Littlewood, K4HF

RARS Webmaster: Hank Montgomery, K4HM

RARS Chairmen:

RARS Food Service Chair: Bill Mars, AK4BL

RARS NC QSO Party Chair: Marty Young, W4MY

RARS 2017 Field Day Chair: Marty Young, W4MY

RARS Volunteer Exam Coordinators – Liz White KO4CK and Joe White, WA4GIR

In addition to this list we need an Education Director and a Youth Director.

RARS Auction: - Tom N4TL introduced Rick Kelly-Crapse, KB4TKQ,
the auctioneer. This concluded the Membership meeting and began the auction.

Respectfully Submitted,

Robert E Chapman, NC1X

RARS Secretary

11 October 2016

RARS Classified

RARS Classified items from the last 30 days.

Micronta VOM for sale, 30,000 ohm/volt Multitester. Model # 22-203U. Comes with meter, test probes, Original manual and Leather case. Work very well. Asking \$35.00 or OBO

Dennis, wz0q, 984-299-4531, Contact: wz0q@outlook.com

Speaker microphones for sale

Posted October 19th, 2016 by: WZ0Q

Contact: wz0q@outlook.com

I have several speaker mic's and 1 hand mic for sale.

1 Alinco EMS-1Z

1 Alinco EMS 9

1 Alinco EMS 2

1 Alinco EMS 8

and 1 Uniden 4 pin round Hand Mic.

\$5.00 each, 984-200-4531, Dennis, wz0q

MFJ -1788 Super Hi-Q Loop Antenna

Posted October 16th, 2016 by: KE4YEM

Contact: edepley@charter.net

MFJ-1788 loop antenna with remote control and MFJ-1312 power supply. I purchased the unit approximately 18 months ago used and have never installed it. The only issue that I am aware of is the housing has an approximate 1 1/2 inch crack in the edge of the housing. I believe that it can be glued -- nothing is missing just cracked. I can email pictures if interested.

\$300.00 Local pickup in the Newton -- Statesville area.

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

By Dan Marks, KW4TI

Welcome to the neighborhood!
You're a favorite at the local barbecue.
Every Saturday, a cacophony of lawnmowers fires up to keep the grass passing inspection. But wait, something is missing. You haven't chatted it up with your distant buddies lately. In fact, you don't even have an antenna up! What to do? How do you stay within your neighbors good graces and satisfy the primal urge to DX?

Well the dream tower is out of the question. Even Gladys Kravitz, creeping around and peering into your shack and seeing your face illuminated by the blinkenlights, thinks that the mothership is overdue in collecting you. But peering around your yard, you notice some natural, organic towers: your trees! Didn't we use one of those as an antenna support for Field Day last year? Mobile phone companies are always disguising their towers as trees, maybe you could disguise your antenna as a real tree. In fact, with a little ingenuity, maybe no one need know it's there.

I don't have the solution for everyone

who has nosy neighbors like Gladys. But those of us who live in the southeastern United States have a unique tree species at our disposal: *Pinus taeda*, or the Loblolly pine. A fast growing tree prized for its lumber and resin, the Loblolly has a shape ideal for a vertical antenna: few lower branches to snag a wire and a bushy crown to hang the wire from. The Loblolly, and the related Longleaf pine, can exceed 100 ft in height and therefore are well over a quarter wavelength on the 80 m band, and about a fifth of a wave on 160 m! Therefore these natural tree towers are an opportunity to realize a multiband antenna of great performance without the expense and appearance of a metal tower. For example, Figure 1 is a picture of the Loblolly trees at my home, with the tree with the antenna on it in a yellow box. Even with a tree 50 ft in height, a vertical antenna may be constructed that easily covers the 40 m to 10 m bands. How do you put up an antenna so large in plain sight and not have it be noticed? Simple: most of it is underground hidden from Gladys.

A vertical antenna consists of several parts as shown in Figure 2, only one of which needs be up in the sky. This is a ver-

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

Continued



Figure 1. Loblolly trees. The antenna is to be hung from the tree denoted by the yellow box around it.

tical wire, in this case suspended from the crown of the tree, which does the actual receiving and radiating. The length of this wire is chosen carefully to cover the HF amateur bands. At the root of the tree is the ground (of course). But it isn't just any ground, it is a radio frequency ground. The RF ground acts as a mirror, so that the "other half" of the antenna is the below ground mirror image of the above ground vertical wire, like the reflection of your face in still water. To make the area around the trunk a good, conductive electrical ground for radio waves, wires called radials are laid just below the soil surface that start at the tree trunk and are pointed outwards from the trunk. The radials are connected together at the trunk to form a single conductor. A third part is a coaxial cable that delivers the radio signal from your transceiver to the antenna, which may also be buried under the ground if the cable is designed for direct burial. The final piece is a transformer called a unun that is placed at the base of the tree and connects the coaxial cable, vertical antenna, and radials. This transformer reduces the reflections of the radio waves when entering the antenna from the coaxial cable so that the antenna can be efficient.

Let's take these pieces one-by-one. The

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

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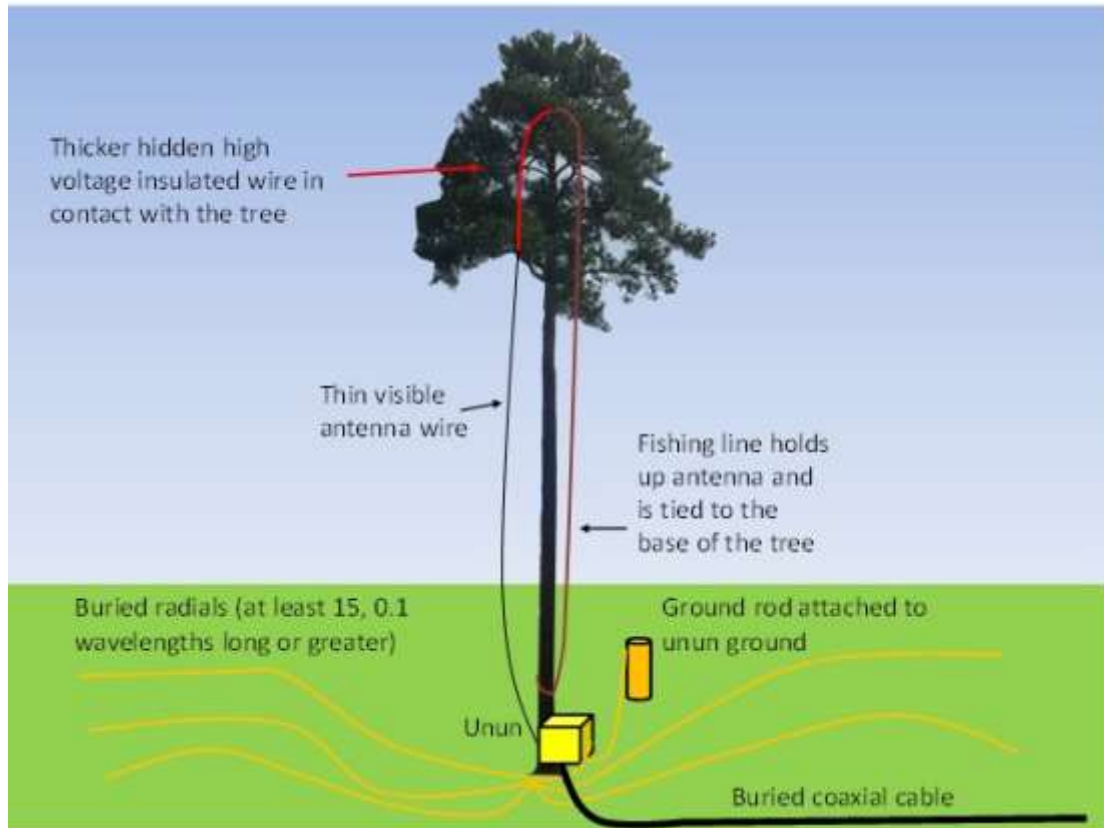


Figure 2. A diagram of the Project Loblolly vertical antenna



Figure 3. Ballpoint pen tube end insulator. The wire is stripped and glued using epoxy into one end of the tube, and a small hole is drilled through the other end of the tube for tying the fishing line.

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

Continued

vertical wire is the business end of the antenna, but also the most visible. To keep a low profile as possible, a thin 18-22 AWG insulated black stranded wire is used for the part of the antenna visible in the sky. For thin, extra strength wire, copper-clad steel antenna wire (e.g. from <http://www.amateurradiosupplies.com/> or <http://thewireman.com>) may be used. When 1.0 mm diameter wire is viewed from a long distance against the sky, it is essentially invisible. However, this wire may not be used for the entire length of the antenna. When high transmitting power is used, the antenna has high voltage on it, and better insulated wire is needed to ensure that the portion of the antenna wire in the crown of the tree does not conduct electricity into the tree. To prevent this, a higher voltage rated wire is used for the portion of the wire in contact with the tree. For low power (100 W or less), one can use THHN (Thermoplastic High Heat-resistant Nylon-coated) wires that are available at a hardware store, which typically insulate up to 600 V. For higher power, one can use electric fence insulated wire, some of which can handle 20 kV. The better insulated wire is thicker but less visible in the crown of the tree except for a short length hanging from the crown. The two sections of wire are soldered together to achieve a specific over-

all length.

So how is the length of the antenna determined? Say you would like a multiband antenna for 80 to 10 m bands. One could create a resonant antenna that is a quarter wavelength on the 40 m band, but then on the 20 m band it would be a half wavelength! While it is relatively easy to drive a quarter wavelength antenna as it has a low impedance, a half wavelength antenna has a very high impedance. This would make driving the antenna in the 20 m band very difficult from the end of the wire. Rather than strive for perfection on all bands, a compromise length is chosen that is not near a half wavelength for any of the common bands, 160 m, 80 m, 40 m, 20 m, 15 m, and 10 m. The impedance is not very low for any of the bands, and it is not excessively high either. Wire lengths of 9 m and 13 m are useful for the 40 m to 10 m bands, and wire lengths of 17 m, 24 m, and 29.5 m are useful for the 80 m to 10 m bands. All we need is a gadget to convert the high impedance to something manageable, so we can transfer the power from the 50 ohm coaxial cable to the antenna.

The unun is the transformer that performs this conversion. Unun is short for unbalanced to un-balanced, that is, unbalanced coax to unbalanced vertical antenna. In this

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

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particular case, we use a 9:1 unun, so that the impedance of the antenna as it appears on the coax side of the transformer is only one-ninth that of the actual antenna impedance. The standing wave ratio (SWR) at the unun is usually reduced to 3:1 to 10:1. This is well within the matching capability of an automatic antenna tuner, which is used between the transmitter and coaxial cable to adapt to the varying impedance. The unun can be obtained from a company such as Balun Designs or DX Engineering, or you can build one cheaply and easily into a weatherproof electrical box available at the big box hardware store, winding it on a ferrite toroid such as a FT240-61, for about \$20 in parts. A FT240-61 toroid can be obtained cheaply from (<http://www.packetradio.com> or <http://kitsandparts.com/>). The unun has three connections: one for the antenna wire, one for the radials, and a third for the coaxial cable.

The radials form the other half of the antenna. The electrons flow back and forth between the vertical antenna and the radials. If the connection to the ground is a high resistance, then power is lost to this resistance rather than being radiated into the sky. A fan of radial wires emerging from the tree trunk covers a large area of the ground around the tree from which the electrons may be collect-

ed. A typical RF ground consists of 15 radials one-tenth of a wavelength long. At the tree, the radials are joined together into a single connection by soldering or using a screw terminal block and connected to the ground on the unun.

Finally, the coaxial cable should be a low-loss type, such as RG213 or Times Microwave LMR400. As the SWR on the cable is relatively high because of the imperfect match at the antenna, the radio wave reflects back and forth several times between the antenna tuner and antenna before being radiated, with more reflections occurring with a higher SWR. Each time the wave travels back-and-forth some power is absorbed. A longer or more lossy cable results in more of the power turning into heat in the cable rather than signal in the air. LMR400 is more expensive, but less lossy, and polyethylene jacket versions may be directly buried out of sight. LMR400-like cable for direct burial may be obtained cheaply from <http://www.air802.com/> or <http://www.shireeninc.com/> for the budget-minded.

So now that we know what all the pieces are, how do we assemble the antenna? To make the antenna wire, we must estimate the length of the insulated antenna wire that is in the tree crown, and the thin stranded

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

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wire that is visible in the sky. Use a tape measure and a digital camera. The tape measure is locked to a known length and hung from the tree. By taking a picture of the tree, the relative lengths of the tape measure, the tree crown, and tree trunk can be measured by counting the number of pixels in the digital photograph covered by each. The actual height of the tree crown and tree trunk can be scaled proportional to the length of the tape measure in feet/meters divided by the length of the tape measure in pixels. Once the height of the tree crown and the tree trunk are known, the thick high voltage insulated and thin antenna wires may be cut to the correct lengths to add up to the desired antenna length and soldered together. It also helps to solder ring terminals on the antenna wire and radials connector to ensure a solid connection to the unun.

To get the tape measure or antenna wire into the tree, it helps to have a ham friend who has done this for Field Day to show you how if you haven't done this before. The idea is to tie braid fishing line to a weight such as a fishing sinker, and then use a casting rod, staff sling, or sling shot (water balloon launcher, Big Shot) to throw the weight over the tree. The fishing line should be unrolled and laid out on the ground or let out from a

casting reel so that the weight easily takes the fishing line up the tree. Once over the tree, the weight may be lowered to the other side, cut from the fishing line, and the tape measure or end insulator attached. It helps to trim any trees or shrubs around the base of the tree so that the fishing line does not get snagged. The fishing line can pull the antenna wire up the tree until the bottom of the antenna wire is just above ground level so the end may be attached to the unun, and then the fishing line is tied around the base of the tree to hold up the antenna wire. Some have used pneumatic projectile launchers to send a weight over the tree as well. Be careful, as anything that can throw a weight over a tall tree can hurt.

To attach the antenna wire to the fishing line, it helps to make a slender end insulator that does not snag on tree branches. This I made from the tube of a ballpoint pen body, as is shown in Figure 3. The end of the antenna wire was stripped and epoxy adhered into one end of the tube, and a small hole was drilled through the other end of the tube through which the fishing line was inserted and tied. The antenna wire need not be pulled taut; in fact a little slack helps it move with the swaying tree, as long as the antenna wire does not become tangled in the branch-

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

Continued

es of other trees.

Burying the 15 or more 20-40 foot radials is the most tedious and unpleasant part. I should know, I accidentally dug up yellow-jackets digging furrows and was stung a couple of times, but hopefully you will not be as unlucky as myself. Unshielded, braided copper wire may be used for the radials, which is more resistant to kinking than solid wire, but may corrode faster. You could attach hunks of aluminum or zinc to your radials and bury it with them to act as a sacrificial anode to reduce corrosion if needed. The radials are generally directed outwards from the tree, but need not be perfectly straight. They can be routed around obstacles as needed with the general idea of covering the most ground. The radials should be 14-20 gauge copper wire, need not be insulated, and are buried just a few inches, deep enough to be protected from damage from lawnmowers or other landscaping implements. Garden staples are useful for holding the radials down until the grass covers them thoroughly. To dig the long, narrow furrows to insert the radials, I made a tool out of a sharpened iron pipe to drag through the ground, which is shown in Figure 4. A landscape edger or trencher also makes quick work of digging the long, nar-

row furrows to bury the radials, but I'm cheap, don't like having to store and maintain more equipment than I have to, and need the exercise anyways, so I made a tool instead. A plate to join the radials may be constructed from stainless steel or aluminum with holes tapped in it to screw each radial to the plate. I soldered my radials together using a hand butane torch, and then insulated the joints in silicone.

Building a unun yourself is not hard. The parts needed are a ferrite toroid such as the FT240-61, some heavily insulated wire, insulating tape, a weatherproof ABS (not conductive) electrical box, a SO-239 coax connector, ring terminals, and 1" 8/32 stainless steel machine screws, nuts, and wingnuts. The 9:1 unun is trifilar, which is three windings side-by-side, wrapped 7 to 10 times around the ferrite core. This is shown in the diagram of Figure 5, with each of the windings a different color. The core should be wrapped in electrical tape, or preferably Teflon tape, as it is slightly conductive. The wire can be 14 to 20 gauge TFN/TFFN/THHN insulated wire which can tolerate voltage up to 600 volts, which is sufficient for low to medium power applications, however larger gauge wire is harder to wind many times around the core. The three windings should

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

Continued



Figure 4. Iron pipe tool to make furrows for the radials. The blade is an iron pipe cut at an angle by an angle grinder or cutoff disc tool.

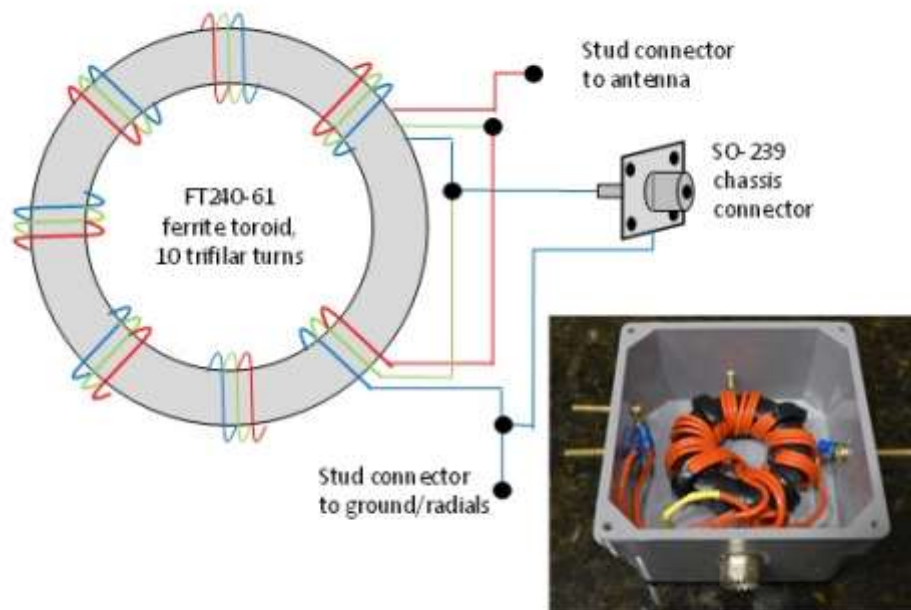


Figure 5. Wiring diagram for a 9:1 trifilar unun. A photograph of the inside of a completed unun is shown as an example. There are two taps on the unun shown for both 4:1 and 9:1 impedance transformation ratios. There is a metal hook on the top of the electrical box to hang the unun from a string tied to the tree.

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be soldered to each other as shown, with a dot indicating an electrical connection. Heatshrink tubing, or at least multiple tight winds of electrical tape, should be used to insulate solder joints. A high power unun requires Teflon insulation as the high voltages in the unun break down ordinary PVC insulation. The first winding (colored blue) should be connected to the terminals of the SO-239 connector. Two stainless steel screws may be used as studs to attach the antenna and radial wires. Ring terminals are soldered onto the transformer wires connecting to the antenna and radial wires, the screws are inserted through the ring terminals, and then outwards through holes drilled into the electrical box. The screw is held in place by a nut on the outside. To attach the antenna or radial wires, slip their ring terminals over the screws and tighten the wingnuts into place. To test to make sure you have wired the unun correctly, an LCR meter may be used. The inductance measured at the terminals of the SO-239 connector should be approximately $50\ \mu\text{H}$, while that measured between the antenna and radials terminal should be approximately nine times this or $450\ \mu\text{H}$. It is not crucial to achieve exactly these inductances, but the

ratio of the inductances should be nearly 9:1 as this is the desired impedance transformation ratio.

The final step is to route the coaxial cable to the antenna tuner and transceiver. If LMR400 direct burial is used, the coaxial cable feed may be buried as well as the radials. Dig a shallow trench and lay the cable in the trench. Again, garden staples are useful to hold the cable down, especially as LMR400 is rather stiff and tends to twist itself out of the trench if not otherwise constrained, and a lawnmower will quickly shred the cable if it is exposed. Be careful not to kink or bend the cable tightly when routing it as the center conductor inside may be damaged; it is best to maintain a minimum bend radius of 9 inches.

It is prudent to sink a copper-clad ground rod next to the tree as well to discharge static electricity and lightning. This rod is also connected to the unun ground. Typically, this rod is $5/8$ inches diameter or larger, and sunk at least 8 feet into the ground as specified by the National Electrical Code 250.32. An easy way to do this is to obtain a copper water pipe at the hardware store and use a hacksaw to cut a wedge on one end. On the other end, sweat a garden hose adapter, and attach

Project Loblolly: a high performance aesthetically pleasing organic vertical antenna

Continued

your garden hose. The pressure of the water coming out of the copper pipe pushes aside dirt and clay and allows the rod to be inserted much more easily than pounding it into the ground. After you are done, you can cut off the garden hose adapter and reuse it to insert more ground rods if necessary. For my installation, I have a second rod where the coaxial cable enters my house with a lightning arrestor connected. Gas-tube lightning arrestors may be obtained from Polyphaser or Alpha Delta Communications. One should err on the side of using a higher power unit, as the power on the cable is higher than the transmitted power due to reflections on the cable.

The antenna works best for bands where the antenna wire length is at least a quarter wavelength at the band used. The achievable SWR without an antenna tuner is generally between 3:1 to 10:1, and typically less than 5:1. However, usually the SWR is too high for many tuners build into transmitters to match, so an external matching unit is needed. As with any antenna, test the antenna with low QRP power (10 watts or less) first to make sure that the reflections are low, as excessive reflected power can damage the transmitter or antenna tuner. If the

antenna has a high SWR on a band for which the antenna is a quarter wavelength long or greater, make sure all antenna connections are secure. It may also be required to trim the antenna wire slightly if the antenna happens to be near a half wavelength on a useful band. The higher SWR results in some additional coax loss, for LMR400 coax at a 5:1 SWR, the losses are 0.58 dB/100 ft at 80 m, 0.78 dB/100 ft at 40 m, 1.06 dB/100 ft at 20 m, 1.28 dB/100 ft at 15 m, and 1.47 dB/100 ft at 10 m. These losses are probably not going to significantly impact performance unless a very long cable run is used.

A low SWR does not guarantee good antenna performance, as SWR indicates that power is not returned to the transmitter, not necessarily that it is radiated. A poor radial system may absorb much power that is not transmitted, resulting in a low SWR but also low radiation efficiency. The grounding system must be low resistance for efficient radiation to occur on bands for which the antenna is shorter than a quarter wavelength. Therefore it is important to not skimp on the radials when building a vertical antenna, even though it is the most labor intensive part of installation. This is a good task to save for cooler weather or an overcast day.

Furthermore, if the thin part of the antenna wire comes in contact with the trunk or branches of the tree, power may be lost to conduction with the tree, so this part of the antenna should not touch the tree. Another potential problem is common-mode current reflected on the coaxial cable shield, producing a "hot microphone." This can be mitigated by clamping on ferrite beads over the coaxial cable to absorb the reflected common-mode current.

For the mathematically minded, I have a model written in the MATLAB programming language of the Project Loblolly antenna system that I used to plan the antenna build, evaluate the performance of the unun, and the effects of the radials and the coaxial cable. This may be obtained on-line, with extensive graphs showing the performance

with various wire lengths and unun toroid materials.

I hope that I provided those of you unlucky enough to have neighbors like Gladys Kravitz, but lucky enough to have tall trees, some ideas on how to build a high performance antenna for a low cost that will not attract undue attention from the neighborhood aesthetics committee. You can attend barbecues holding your head high, knowing that you can accommodate your neighbors and your DXing, maintaining harmony between hams and obsessive landscapers everywhere.

73 Dan Marks, KW4TI

Durham, NC

